

determined. The treaty signers will meet later this year to discuss this and other problems that have already surfaced. One such problem is that there is considerable scientific uncertainty as to how, or if, many species can even be saved. Another problem is how to balance access to genetic material with biotechnology profits. The treaty signers also face questions about how the treaty will be financed, how the technology will be shared, and how the permanent secretariat will be established.

The treaty became legally binding after the 30th signer, Mongolia, ratified it. Among the other countries that have ratified the treaty are industrialized nations such as Canada, Japan, Norway, and Australia, and a number of developing countries such as Uganda, Nepal, the Philippines, and Ecuador. "I think its worth remarking that the first 30 ratifications came overwhelmingly from the lower-income countries," Angela Cropper of Trinidad and Tobago, executive secretary of the treaty's interim secretariat, told the *The New York Times*. "Biological diversity—our food and medicines as well as the treasure house of animals and plants—come mainly from the tropical and developing nations. If we want to continue to profit from this wealth, we must make it worthwhile for poor countries to protect this heritage," she said.

## No Fun in the Sun

Sunbathers who believe using sunscreens or tanning at indoor salons make tanning safe may soon see a dark cloud on the horizon. In the past, some scientists assured the public that the use of sunscreen would help prevent skin cancers, including melanoma, the deadliest form of skin cancer. It has also been generally accepted that the use of UV-A light in tanning salons is a safe alternative to the shorter wavelength UV-B, which was thought to induce melanoma. But recent studies on how ultraviolet light affects the skin challenge these theories.

A study by Peter Wolf and colleagues at the M. D. Anderson Cancer Center in Houston found that while sunscreen did protect mice from sunburn when they were exposed to ultraviolet light, it did not protect them from developing melanomas. Because sunscreen has been proven to help prevent the development of some forms of skin cancer, the researchers had expected

sunscreen to protect against developing melanomas also.

The three sunscreens used in the study contained FDA category I sunscreens with the maximum approved concentration of the single compounds being tested by the researchers. Two of the three were UV-B-absorbing sunscreen preparations with an anti-inflammatory sun protection factor (SPF) of at least eight in mice. The third sunscreen preparation was a UV-A and UV-B absorber with an SPF of at least four. The researchers applied the sunscreens to the ears of mice and then injected them with melanoma cells. When they exposed the mice to ultraviolet light, the melanoma cells grew more aggressively than usual. They also observed that ultraviolet light suppressed the immune system of the mice. "What we found was that the exposure of skin to ultraviolet light will result in a change in the immunological environment," said Cherrie E. Donawho, one of the researchers. The breakdown of the immune system may be a factor in the development of melanomas. Even when sunscreen was applied and no noticeable damage was done to the skin by the ultraviolet light, the immune system was still suppressed. This suggests that even when the skin does not burn, there may be changes below the surface.

According to the researchers, the use of sunscreen may actually contribute to the risk of developing melanomas because protection against sunburn may encourage prolonged exposure to the sun. If melanomas are a result of exposure to ultraviolet light, rather than a result of sunburn, the longer periods of sun exposure may increase the risk of melanoma.

Beliefs about the "safe" light currently used in tanning salons may also be incorrect. In the past, UV-A light has been considered safer than shorter wavelength UV-B because it is not as readily absorbed by DNA and is therefore less likely to damage it. However, recently published research suggests that direct damage to DNA is not the only cancer-causing event caused by UV light, and UV-A light is not as safe as previously thought.

Richard B. Setlow led a study at the Brookhaven National Laboratory on the effect of different wavelengths of light on pigmented hybrid fish that are very sensitive to melanoma. He found that the group of fish exposed to UV-A light

developed the same number of melanomas as the group of fish exposed to UV-B light. This suggests that wavelengths of light not directly absorbed by DNA still contribute to the development of melanoma. Setlow believes that the skin pigment melanin absorbs the radiation in UV-A and in turn affects DNA by energy or free radical transfer, thereby inducing melanoma.

The fish used in the experiment are bred to be extremely sensitive to melanoma, more sensitive than even fair-skinned humans, Setlow said. Darker-skinned people do not develop as many melanomas as fairer-skinned people. But he believes the fish can serve as a good model for the effects of UV light on humans. "The sensitivity of the fish versus humans is not important. What is important is the relative effect of wavelengths on the pigment cells," he said.

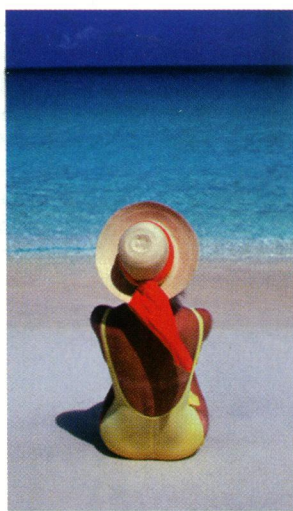
Setlow's advice to reduce chances of developing melanoma is to slowly tan, rather than expose skin to the sun in fewer, longer episodes. "To go out into the sun and get an episode of lots of light is probably bad," he said.

## New R&D Directions

On March 28, a meeting was convened in Washington, DC, to set in motion the Clinton administration's plans for revamping federal scientific research and development. The National Forum on Environment and Natural Resources Research and Development assembled representatives of the scientific community, the private sector, Congress, state and local governments, and nongovernmental organizations to provide their insights to the members of the agencies represented on the Committee on Environment and Natural Resources Research (CENR) of the National Science and Technology Council (NSTC).

The NSTC, chaired by the president, was created by Executive Order 12881 on 23 November 1993 as a cabinet-level body to coordinate science, space, and technology policies throughout the government. Said President Clinton in announcing the NSTC, "Science and technology are essential tools for achieving the administration's goals for strengthening the economy, creating high-quality jobs, protecting the environment, improving our health care and education systems, and maintaining our national security."

The forum, sponsored by the White House Office of Science and Technology Policy, the National Academy of Sciences, and the National Academy of Engineering, in addition to the NSTC, was the first in a series of planning efforts to develop a long-term strategy for the nation's R&D programs. Before the meeting, the agencies of



**What's in a name?** Sunscreens may not really screen out the most harmful effects of tanning.